PCM Downlink CSCI
Thor DP3

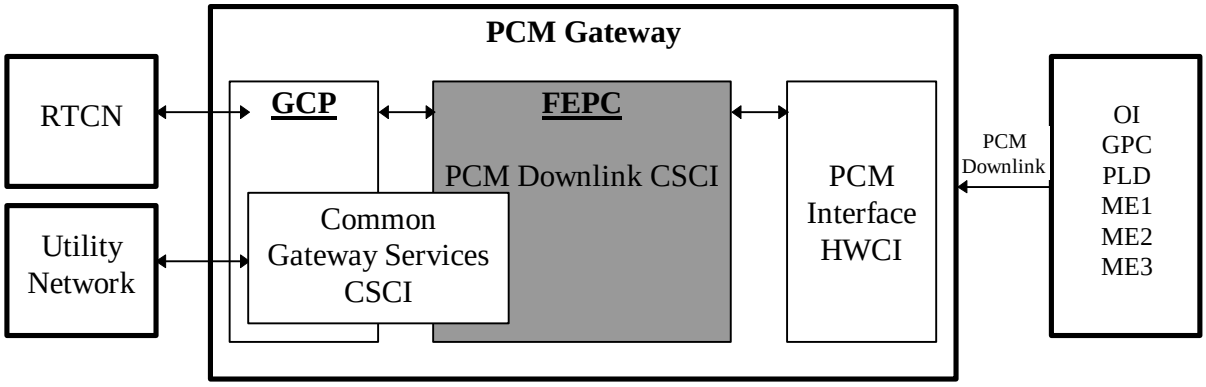
Version 2.0
November 24, 1997

1. PCM Downlink CSCI

1.1 PCM Downlink CSCI Introduction

1.1.1 PCM Downlink CSCI Overview

The PCM Downlink CSCI provides the functionality required to interface to the PCM downlink telemetry stream. This functionality includes the ability to acquire and process measurement data received from various Orbiter sources such as: Operational Flight Instrumentation (OFI) and Space Shuttle Main Engine (SSME). The data is processed as determined by TCID tables and communicated to the CLCS through the GCP Service API which is part of the Common Gateway Service CSCI. The PCM Downlink CSCI resides on the Front End Control Processor within the PCM Downlink gateway.



Gateway Control Processor (GCP)

Common gateway Services CSCI
- Gateway Initialization CSC
- Gateway FEPC Services CSC
- Gateway Command and Response CSC
- Gateway RTCN Service CSC
- Gateway Subsystem Integrity CSC
- Gateway Utility Services CSC
- Gateway GCP Service API CSC
- Gateway maintenance user Interface CSC
- Gateway Integrated Test Environment CSC

Front End Control Processor (FEPC)

Common Gateway Services CSCI
- Gateway GCP Service API CSC
- Gateway FEPC Services CSC
- Gateway Subsystem Integrity CSC

PCM Downlink CSCI
- **PCM Initialization CSC**
- **PCM Table Load and Initialization CSC**
- PCM Decommutation CSC

1.1.2 PCM Downlink CSCI Groundrules

The following will not be provided in the Thor delivery

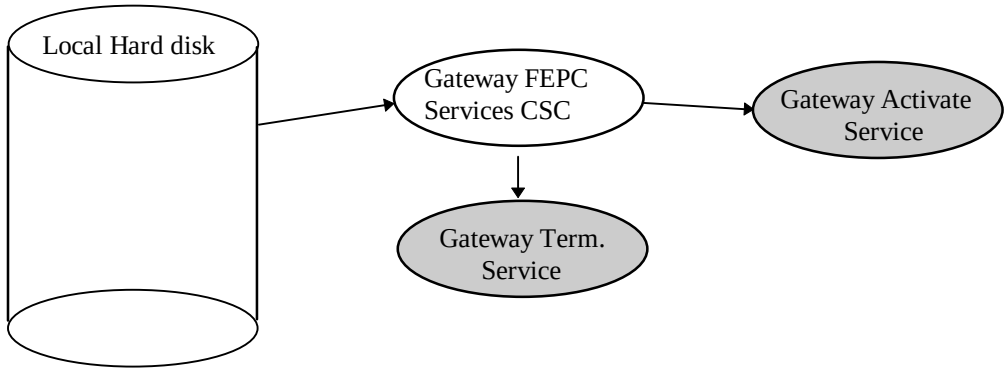
1 Redundancy / Switchover
2 PCM Main Engine data processing.
3 PCM Payload data processing.
4 PCM GMT Correlation.

2. PCM INITIALIZATION CSC

2.1 PCM INITIALIZATION CSC Introduction

2.1.1 PCM Initialization CSC Overview

The PCM Initialization CSC is responsible for performing initialization and termination which is unique to the PCM Front End Control Processor (FEPC) card within the PCM Downlink gateway. This CSC provides activate and terminate functions required by the Gateway FEPC Services CSC during FEPC initialization.



2.1.2 PCM Initialization CSC Operational Description

During FEPC initialization, The PCM Initialization CSC provides the activate and terminate functions required by the Gateway FEPC Services CSC. The activate function performs PCM specific activation of PCM tasks supporting: measurement processing, PCM decommutation and PCM I/F configuration. The terminate function sends a terminate signal causing all PCM unique tasks to terminate gracefully to allow the FEPC to return to Ready mode.

2.2 PCM INITIALIZATION CSC Specifications

2.2.1 PCM Initialization CSC Groundrules

- The Gateway GCP Services API, Gateway Subsystem Integrity and FEPC Services CSC's are implemented under the Gateway Common Service CSCI.

2.2.2 PCM Initialization CSC Functional Requirements

1 PCM FEPC Initialization

1.1 **The PCM Initialization shall provide the capability to perform PCM unique CSC's activation as part of activate command.**

1.2 **The PCM Initialization shall record all initialization messages on local storage media.**

1.3 **The PCM Initialization shall generate a system message due to an error.**

2 PCM FEPC Termination

2.1 The PCM Initialization shall accept and process request to terminate (Terminate Gateway) the subsystem only when data acquisition is inhibited.

~~2.2 The PCM Initialization shall notify the system when it receives and processes a terminate command.~~

2.3 The PCM Initialization shall update status information during termination of subsystem processing.

2.4 The PCM Initialization shall record all termination messages on local storage media.

2.5 The PCM Initialization shall generate a system message prior to self termination of subsystem processing.

2.6 The PCM Initialization shall return to Ready mode when termination is successful.

3 Redundancy (post Thor)

3.1 The PCM Gateway shall provide the capability to be configured as part of an active/standby pair.

3.2 The active PCM Gateway shall provide the capability to request an active/standby switchover when a failure renders the active PCM Gateway incapable of supporting operations.

3.3 Only the active PCM Gateway shall write command and/or measurement data to the RTCN.

3.4 Both active and standby PCM Gateways shall update health and status to the RTCN.

3.5 The active PCM Gateway shall send tables to the standby PCM Gateway at load time.

3.6 The PCM Gateway shall maintain table sync between the active and standby PCM Gateways.

3.7 Both the active and standby PCM Gateways shall receive Test End Item (TEI) data.

3.8 Only the active PCM Gateway shall issue a response to a command request.

3.9 A demand checkpoint update shall be discontinued when a switch-over from Active to Standby occurs.

3.10 Switch-over from the active to standby PCM Gateway shall be accomplished with no loss of commands.

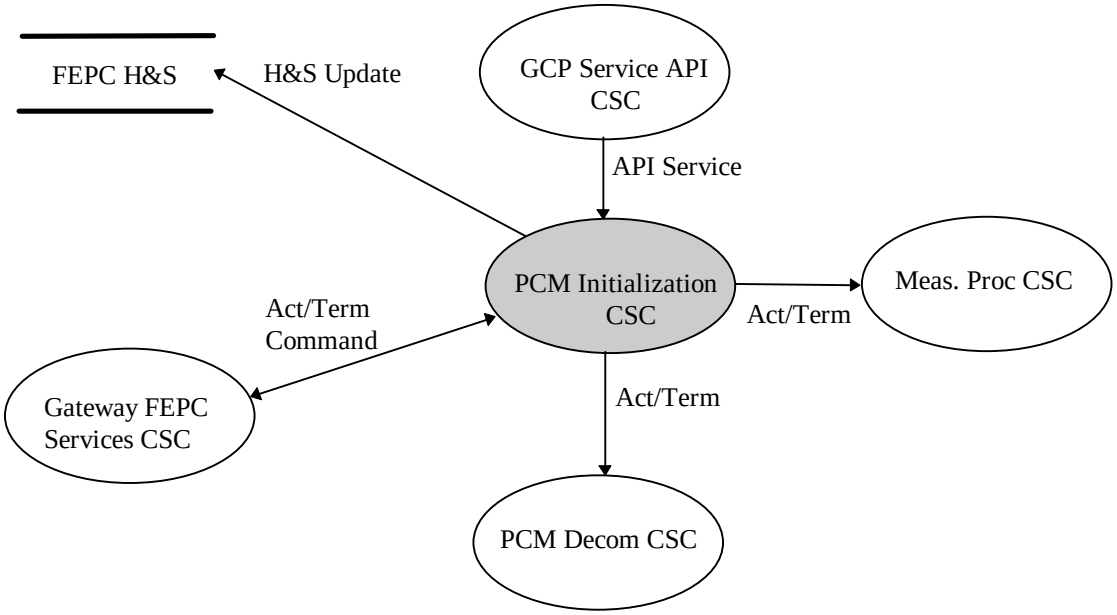
3.11 Any PCM Gateway shall be capable of operating independently of all other PCM Gateways even if configured as part of an active/standby pair.

3.12 The active PCM Gateway shall request an active/standby switchover and continue to process data when the number of consecutive PCM sync errors reaches the sync error threshold and the standby is still in go mode.

2.2.3 PCM Initialization CSC Performance Requirements

- None.

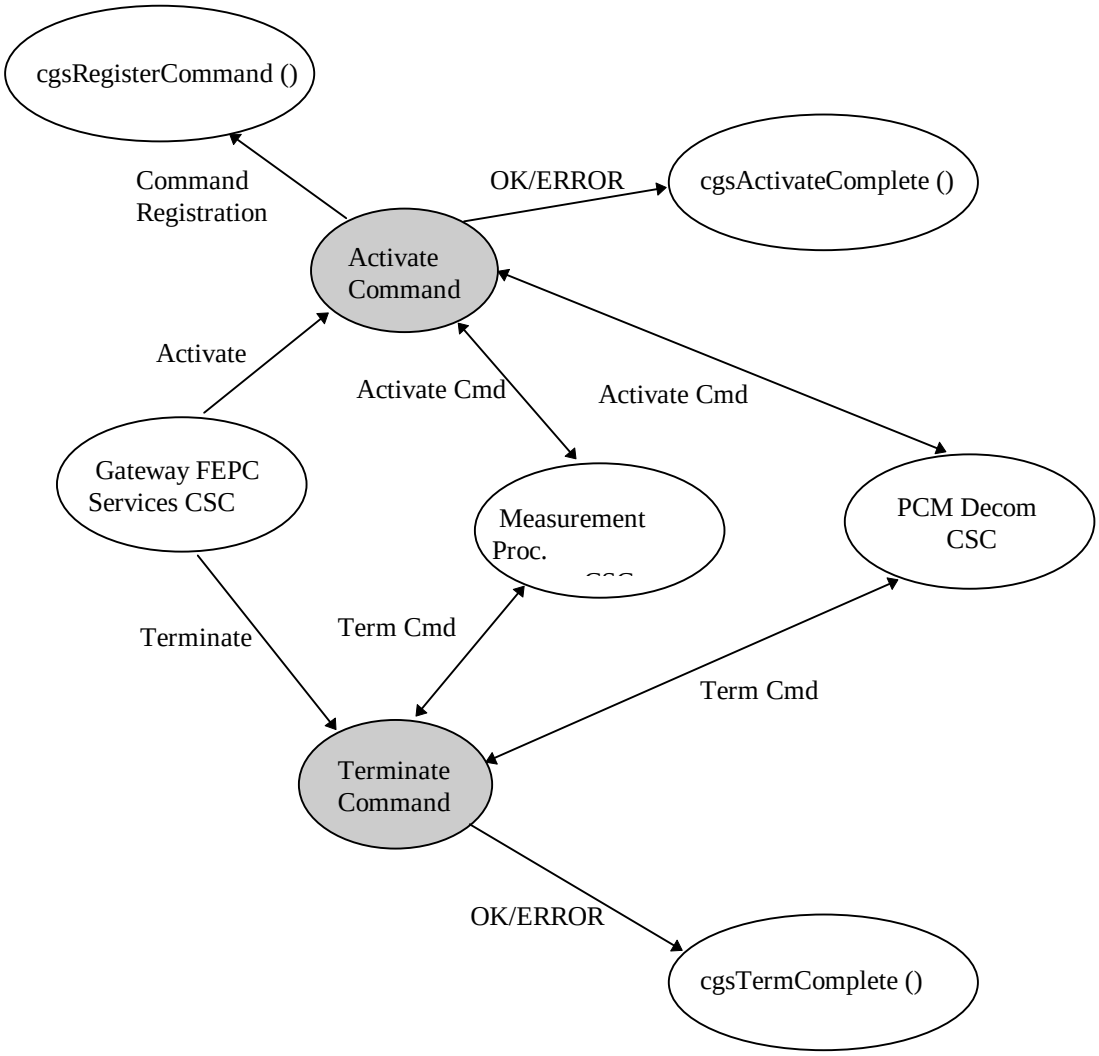
2.2.4 PCM Initialization CSC Interfaces Data Flow Diagrams



The PCM Initialization CSC provides functions which are called as part of the FEPC Initialization. An activate function is provided by this CSC to spawn PCM unique tasks when transition to Operational mode. A terminate function is also provided to terminate PCM unique tasks gracefully. Both functions are required by the Gateway FEPC Services CSC during the FEPC initialization. The PCM Initialization will update health and status information if required.

2.3 PCM INITIALIZATION CSC Design Specifications

2.3.1 PCM Initialization CSC Detailed Data Flow Diagrams



The PCM Initialization CSC provides functions which are called as part of the FEPC Initialization.

An activate function performs activation of all PCM unique CSC's tasks. Each task is spawned by calling an initialization function provided by that CSC. Also a set of command function is registered for later use by the Common Command Processor. Activation status (OK or ERROR) is passed to the FEPC Initialization processor by calling cgsActivateComplete() function. A system message will be generated if failed to activate.

A terminate function performs termination of all PCM unique CSC's tasks. Each task is terminated gracefully when receive a terminate signal. Termination status (OK or ERROR) is passed to the FEPC Initialization Processor by calling cgsTerminateComplete() function. System messages will be generated during termination process.

2.3.2 PCM Initialization CSC External Interfaces

2.3.2.1 PCM Initialization CSC Message Formats

2.3.2.1.1 Activation Failed

Message Number = TBD
Message Group = TBD
Severity = Error

PCM FEPC Activation Failed

The PCM FEPC failed to activate. Details may be found in the PCM gateway local log file.

2.3.2.1.2 FEPC Terminated

Message Number = TBD
Message Group = TBD
Severity = Error

PCM FEPC Terminated

The FEPC PCM unique tasks have been terminated by a Terminate command.

2.3.2.2 **PCM Initialization CSC C-to-C Communications**

None

2.3.2.3 **PCM Initialization CSC External Interface Calls**

2.3.2.3.1 PCM Activate

Void pcmActivate (CGS_COMMAND_INFO_TYPE *info,
void *body);

Description:

This function is called by the FEPC Common Initialization CSC to activate all PCM unique CSC's tasks. An ISSUED_RESPONSE will be issued. Activation status (OK or ERROR) is passed to cgsActivateComplete() function before exiting.

Parameters:

Info - Pointer to a CGS_COMMAND_INFO_TYPE structure as defined by the GCP Common Gateway Service API.

Body - Pointer to the message body.

2.3.2.3.2 PCM Terminate

Void pcmTerminate (CGS_COMMAND_INFO_TYPE *info,
void *body);

Description:

This function is called by the FEPC Common Initialization CSC to terminate all PCM unique CSC's tasks. An ISSUED_RESPONSE will be issued. Termination status (OK or ERROR) is passed to cgsTerminateComplete() function before exiting.

Parameters:

Info - Pointer to a CGS_COMMAND_INFO_TYPE structure as defined by the GCP Common Gateway Service API.

Body - Pointer to the message body.

2.3.3 PCM Initialization CSC Test Plan

2.3.3.1 **Environment**

A development PCM gateway will be connected to a PCM simulator developed by the gateway group. TCID tables will be present on the PCM gateway local hard disk. Each of the commands supported by the PCM Initialization CSC will be sent. The action taken by the command and the response returned will be verified.

2.3.3.2 **Test Tools**

The PCM gateway will be commanded using a CCP simulator test tool developed by the gateway group. This tool is capable of generating and displaying the responses of all PCM gateway commands supported.

The PCM gateway will be connected to a PCM simulator test tool developed by the gateway group. This tool is capable of producing PCM telemetry up to but not limited to 128Kbps without voice or 192Kbps with voice. PCM Errors such as: Frame Sync., Frame Count, Measurement Data, etc. can also be created to support requirements verification.

2.3.3.3 **Test Cases**

Process Activate Command
Process Terminate Command

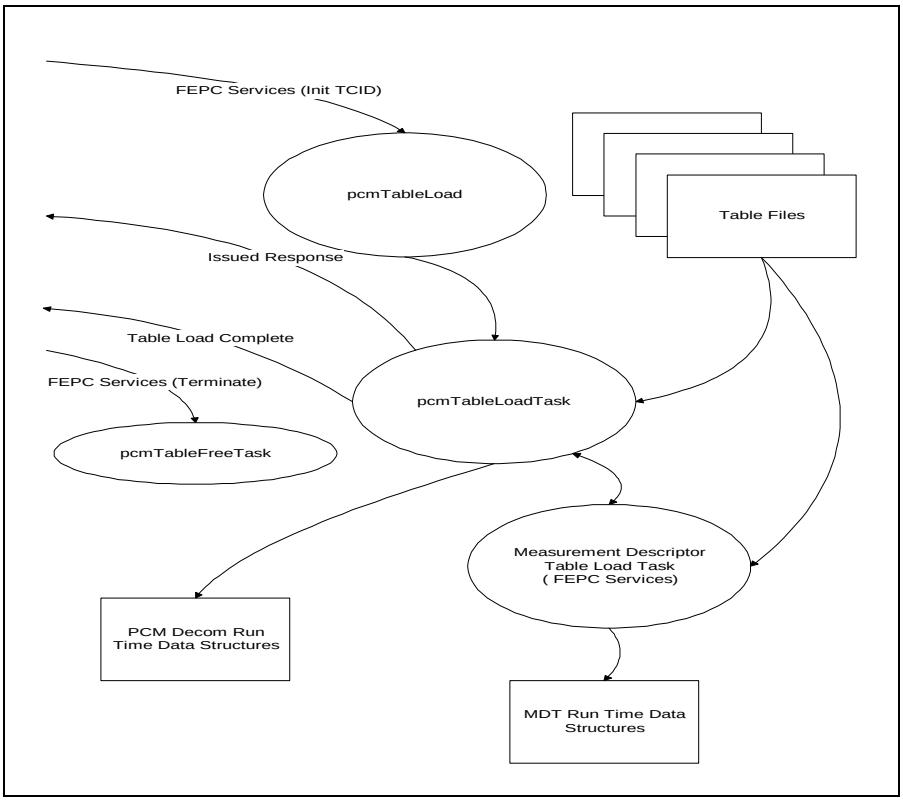
3. PCM Table Load and Initialization CSC

3.1 PCM Table Load and Initialization CSC Introduction

3.1.1 PCM Table Load and Initialization CSC Overview

The PCM Table Load and Initialization CSC is part of the PCM Gateway Services CSCI. The CSC is responsible for loading the TCID tables from the hard drive into memory and verifying their content.

3.1.2 Data Flow Diagram



3.1.3 PCM Table Load and Initialization CSC Operational Description

The PCM Table Load and Initialization CSC is commanded to load the PCM unique TCID tables from the local hard drive by the FEPC Services CSC in response to a Init TCID command. The TCID files to be loaded are the PCM Format Descriptor Tables, the PCM Format List Tables, and the Measurement Descriptor Tables. The PCM Table Load and Initialization CSC will open the file, obtain the number of records, allocate memory based on the record count, use the fscanf() function to read each record and then verify that the expected number of entries are present. The internal data structures will then be built and populated.

3.2 Table Load and Initialization CSC Specifications

3.2.1 PCM Table Load and Initialization CSC Groundrules

1 System software and TCID tables will be resident on the local hard drive.

2 System software will be loaded from the local hard drive during power up and on command (Initialize SCID or reboot).

3 TCID tables will be loaded when an initialize TCID command is received.

4 The following tables will be provided by build as part of the TCID information at load / initialization time:
- 4.1 Format Descriptor Tables
- 4.2 Format List Tables
- 4.3 Measurement Descriptor Tables

5 The interface to the Gateway Common Services CSCI on the GCP will be implemented using the GCP Services API.

3.2.2 PCM Table Load and Initialization CSC Functional Requirements

1 PCM Table Load and Initialization CSC shall load all required TCID tables from the local hard drive when the Initialize TCID command is received.

2 PCM Table Load and Initialization CSC shall respond to the Initialize TCID command with a success or fail status.

3 PCM Table Load and Initialization CSC shall perform the following verification checks on the loaded tables.
- 3.1 Correct entries per record will be checked.
- 3.2 EU coefficients which are used by the CMDT will be tested to ensure at least a first order polynomial is present.

3.2.3 PCM Table Load and Initialization CSC Performance Requirements

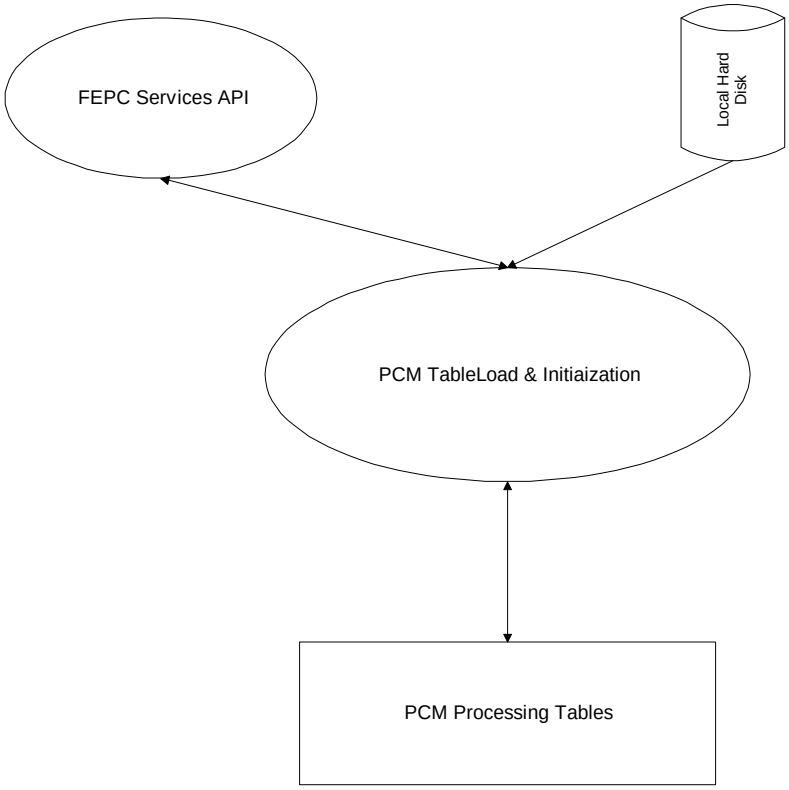
No performance requirements have been identified for this CSC for the Thor delivery.

3.3 PCM Table Load and Initialization CSC Design Specification

The PCM Table Load and Initialization CSC provides a pcmTableLoadTask() function call to the FEPC Common Initialization CSC which will be performed in response to a Load TCID command. This function will read the ascii files from the local hard disk and create the required data structures

Table load and verification status will be output to the local log file via the GCP Services API. A system message will be generated via the same API if an error occurs during load or verification.

3.3.1 PCM Table Load and Initialization CSC External Interfaces



3.3.1.1 PCM Table Load and Initialization CSC Message Formats

3.3.1.1.1 Memory Allocation Error

Message Number =
Message Group = _____
Severity = Error

Unable to allocate memory for %s table.

Insert #1 Text String Table Name

- Format Descriptor Table
- Telemetry Descriptor
- Format List

3.3.1.1.2 File Open Failure

Message Number =

Message Group = _____
Severity = Error

Unable to open file %s

Insert #1 Text String File Name

- PCM files

3.3.1.1.3 File Scan Failure

Message Number =
Message Group = _____
Severity = Error

Scan error reading file %s at line %d

Insert #1	Text String	File name • fdt_tab • flst_tab
Insert #2	Integer	Line number

Details:

An error occurred while reading the specified file at the indicated line. Either the number of elements in the record was incorrect or an unexpected end-of-file was encountered.

3.3.1.2 C-to-C Communications

This CSC is not responsible for managing any of the PCM C-to-C communications.

3.3.1.3 PCM Table Load and External CSC Calls

3.3.1.3.1 Load PCM Tables Function

VOID **pcmTableLoad(CGS_COMMAND_INFO_TYPE *info, void *body, char *directory)**

Description:	This function is called in response to a Load TCID command from the FEPC Services CSC and will spawn the pcmTableLoadTask function and return.	
Parameters:	info	Activate packet header information
	body	Activate packet body
	directory	A pointer to a character string containing the path to the directory where the TCID tables are located. The path string is terminated by a "/" character
Returns:	Nothing	

3.3.1.3.2 Load PCM Tables Command

STATUS **pcmTableLoadTask(char * path);**

Description:	This function is called from pcmTableLoad function and will load all the PCM Gateway tables and call the cgsTableLoadComplete function.	
Parameters:	path	A pointer to a character string containing the path to the directory where the TCID tables are located. The path string is terminated by a "/" character
Returns:	OK or ERROR as defined by vxWorks.h	

3.3.1.3.3 Unload PCM Tables Command

void **pcmTableFreeTask();**

Description:	This function is called from the FEPC Services CSC in response to a Terminate command and will free all the memory used for the PCM Gateway tables.	
Parameters:	None	
Returns:	Nothing	

3.3.1.4 PCM Table Load and Initialization CSC Table Formats

All tables are represented a ASCII flat files with one record per line. The first line of each file contains the record count

3.3.1.4.1 File Record Formats

File Name: ***fdt_tab***
Format Descriptor file

Field	*Notation*	*Description*
Number_fit_ents	Hex	Number of FIT records

fit	See below	FIT Record 1 thru n
atdt_ent	Hex	Number of Telemetry Descriptor Records (ATDT)
atdt	See below	ATDT Record 1 thru n

FIT Record

Field	*Notation*	*Description*
fit_fid	Hex	Format Flags/Identification Number Bit 0 = spare Bits 1-3 = Format Type = 1 OI Format = 2 GPC Format = 3 CDL Format = 4 PLD Format Bit 4 = Data Size (0=16 bits, 1=8 bits) Bit 5 = 1 Low Data Rate Bit 6 = 1 High Data Rate Bit 7 = 1 Type II or VI Data Bits 8-15 = Format ID (0-255)
sf_str	Hex	Subframe Start Value
sf_num	Hex	Number of Subframes per Major Frame
sf_incr	Hex	Subframe Increment Value
mf_str	Hex	Minor Frame Start Value
mf_num	Hex	Number Minor Frames per Subframe
mf_incr	Hex	Minor Frame Increment Value
chan_str	Hex	Channel Start Value
fbit_rate	Hex	Format Bit Rate (KBPS)
mf_time	Decimal	Major Frame Period (seconds)

Format Descriptor File Record (ATDT)

Field	*Notation*	*Description*
adt_fid	Hex	Format Identification Number (0-255)
a0_bw		Area 0 Bandwidth (words) Bit 0 = spare Bits 1-3 = Format Type = 1 OI Format = 2 GPC Format = 3 CDL Format = 4 PLD Format Bit 4 = Data Size (0=16 bits, 1=8 bits) Bits 5-7 = spares Bits 8-15 = Bandwidth Size
a1_bw	Hex	Area 1 Bandwidth (words)
a2_bw	Hex	Area 2 Bandwidth (words)
a3_bw	Hex	Area 3 Bandwidth (words)
a4_bw	Hex	Area 4 Bandwidth (words)
a5_bw	Hex	Area 5 Bandwidth (words)
a6_bw	Hex	Area 6 Bandwidth (words)
a7_bw	Hex	Area 7 Bandwidth (words)
dcm1_an	Hex	Decom 1 Area Number (1 - 4)

dcm2_an	Hex	Decom 2 Area Number (1 - 4)
dcm3_an	Hex	Decom 3 Area Number (1 - 4)
dcm4_an	Hex	Decom 4 Area Number (1 - 4)
sync_word1	Hex	Sync Word 1
sync_word2	Hex	Sync Word 2
sync_mask1	Hex	Sync Mask 1
sync_mask2	Hex	Sync Mask 2
frame_len	Hex	Frame Length
word_len	Hex	Word Length
asb_err	Hex	Allowable Sync Bits in Error (0-3)
pcm_code	Hex	PCM Telemetry Type =0 NRZ-L =8 M(square) =1 NRZ-M =9 M(square)-S =2 NRZ-S =A Inverted NRZ-L =3 BIO-L =B Invertrd BIO-L =4 BIO-M =C RZ =5 BIO-S =D Inverted RZ =6 DM-M =E RNRZ11 =7 DM-S =F RNRZ15
loop_sel	Hex	Loop Width Selection =1 0.1% =7 0.7% =2 0.2% =8 0.8% =3 0.3% =9 0.9% =4 0.4% =A 1% =5 0.5% =B 2% =6 0.6% =C 3%
source_sel	Hex	Source Selection (1-4)
pol_sel	Hex	Polarity Selection (0=+, 1=-)
rate_sel	Hex	Data Rate Selection (0=low, 1=high)
bit_rate	Hex	Bit Rate (KBPS)

File Name: ***flst_tab***

Format List File Header

Field	*Notation*	*Description*
fmtlst_num	Hex	Number of format lists in file
fmtlst_tsize	Hex	Format List Size

Format List Header Record

Field	*Notation*	*Description*
fmtlst_fid	Hex	Format List Identification
fmtlst_size	Hex	Format List Size
fmtlst_ents	Hex	Number of entries in Format List

Format List Entry Record

Field	*Notation*	*Description*
fmtlst_mf	Hex	Format List minor frame count
fmtlst_chan	Hex	Format List channel number
fmtlst_sbit	Hex	Format List start bit
fmtlst_len	Hex	Format List number of words
fmtlst_srate	Hex	Format List FDID sample rate
fmtlst_mdt	Hex	Format List MDT index pointer
fmtlst_fdid	Hex	FD Identification (null = FFFFFFFF)

3.3.2 PCM Table Load and Initialization CSC Test Plan

3.3.2.1 Environment

A development PCM gateway will be connected to a pcm simulator. At least one measurement for each of the data types supported will be present. TCID tables will be present on the PCM gateway local hard drive. Each of the tables supported will be loaded.

3.3.2.2 Test Tools

The PCM gateway will be commanded using a CCP simulator test tool developed by the gateway group. This tool is capable of generating and displaying the responses of all PCM gateway commands supported.

3.3.2.3 Test Cases

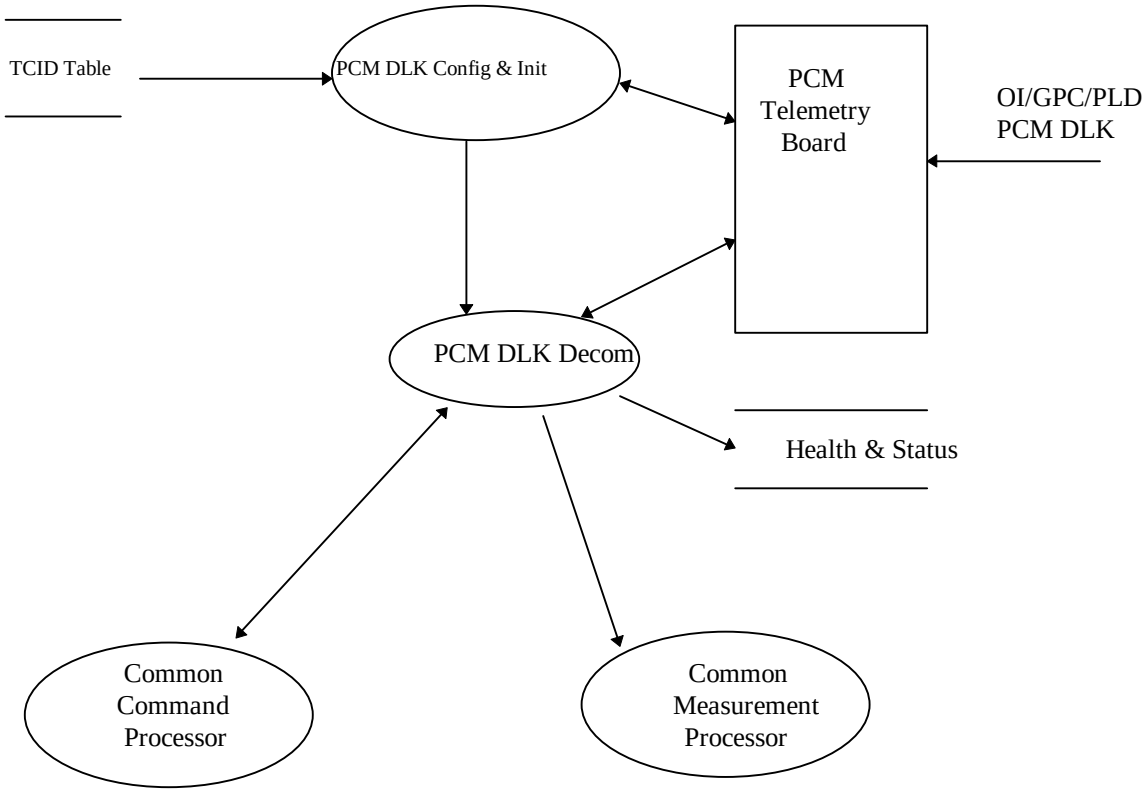
One entry for each measurement type will be printed out and verified

4. PCM DLK DECOMMUTATION CSC

4.1 PCM DLK DECOMMUTATION CSC Introduction

4.1.1 PCM DLK DECOMMUTATION CSC Overview

The PCM DLK Decommutation CSC is responsible for interfacing with the PCM Downlink HWCI. This CSC initializes the HWCI to accept downlink telemetry from various Real Time Processing System external interfaces. This CSC extracts measurement data from the input telemetry stream as directed by Format Lists defined in the TCID Tables, and sends the data to the Common Measurement Processor to be processed. This CSC is responsible for detecting hardware interface errors and for notifying CLCS via the System Message Interface when an error occurs. It also logs the frame data in which an interface error occurs.



4.1.2 PCM DLK DECOMMUTATION CSC Operational Description

The PCM DLK Decommutation CSC provides several function calls for use by other CSC's. These function calls contain all information required to setup and control the PCM Downlink HWCI. This CSC will use these functions to process a request to define processing and telemetry characteristics, as well as to start and stop data acquisition. When data acquisition is activated, this CSC uses information supplied with the request to access all the required tables in the TCID to initialize the PCM Downlink HWCI and to begin Decom Processing.

The PCM Downlink HWCI digitizes and blocks the telemetry stream in internal toggle buffers as specified by the setup parameters sent to the hardware by this CSC. The PCM DLK Decommutation CSC is notified via interrupt when a frame of data is available to read out of a toggle buffer.

The PCM DLK Decommutation CSC tracks and processes the data frame as specified in the predefined Gateway TCID Tables. The Format List(FL) entries track the data words one for one and provides a pointer to a Measurement Descriptor Table(MDT) which controls the processing characteristics of each measurement. This CSC extracts the value from the frame data and sends it and a pointer to the appropriate MDT to the Common Measurement Processor to be processed.

In multiformat PCM Downlink Gateways, this CSC is responsible for detecting Format ID(FID) changes in the telemetry stream. It stops processing of the affected data, performs the functions necessary for processing the new format, and verifies that the new FID is valid.

4.2 PCM DLK DECOMMUTATION CSC Specifications

4.2.1 PCM DLK DECOMMUTATION CSC Groundrules

- TCID tables must be loaded to the Gateway local media storage prior to initialization.
- The GCP Service API is implemented under the Gateway Common Service CSCI.
- All PCM links should be attached.

4.2.2 PCM DLK DECOMMUTATION CSC Functional Requirements

1 INITIALIZATION

1.1 The PCM Downlink Gateway shall acquire Pulse Code Modulation (PCM) Downlink data, defined in the Gateway tables, from the Real Time Processing System external interface.

1.2 The PCM Downlink Gateway shall provide the capability to select different PCM inputs and update Health and Status with the selection (PCM Select C-C).

1.3 The PCM Downlink Gateway shall provide the capability to detect a valid received sync pattern and its initial polarity.

1.4 The PCM Downlink Gateway shall automatically reverse the polarity on the bit synchronizer if 10 consecutive sync errors received while the bit synchronizer is locked onto the data stream.

1.5 The PCM Downlink Gateway shall process PCM Select Commands and allow these parameters to be changed: loop bandwidth, source, polarity, rate, and voice (PCM Select C-C).

1.6 The PCM Downlink Gateway shall update the new parameters from a PCM Select Command and update the Health and Status area (PCM Select C-C).

1.7 The PCM Downlink Gateway shall provide the capability to process “immediate” PCM Select Commands (PCM Select C-C).

1.8 The PCM Downlink Gateway shall provide the capability to process “pending” PCM Select Commands and set the sync error threshold value to 3 sync errors (PCM Select C-C).

1.9 The PCM Downlink Gateway shall provide the capability to process “cancel” PCM Select Commands (PCM Select C-C).

1.10 The PCM Downlink Gateway shall cancel any previous pending PCM Select Command and restore the sync error threshold value to 100 sync errors for a “cancel” PCM Select Command (PCM Select C-C).

1.11 The PCM Downlink Gateway shall process requests to change the number of allowable sync-bits in error (PCM Change Sync. Bits in Error C-C).

2 DATA ACQUISITION

2.1 The PCM Downlink Gateway shall process requests to Activate/Inhibit Data Acquisition (PCM, Activate Data Acquisition C-C and Inhibit Data Acquisition C-C).

2.2 The PCM Downlink Gateway shall provide the capability to Block Log each minor frame of data before processing it (PCM Activate Frame Logging C-C).

2.3 The PCM Downlink Gateway shall issue a system message and update the Health and Status area upon detection of a front end interface error.

2.4 The PCM Downlink Gateway shall report any data dropouts to the Common Measurement Processor.

2.5 The PCM Downlink Gateway shall issue a system message and update the Health and Status area upon detection of data acquisition errors.

2.6 The PCM Downlink Gateway shall execute a Pending Change/Select Command when sync error threshold is reached.

2.7 The PCM Downlink Gateway shall be capable of determining and verifying the format identification and partitioning the telemetry stream into separate areas and measurements as defined by the format specifications.

2.8 The PCM Downlink Gateway shall correlate the internal organization of a PCM master frame with locally resident PCM downlink format lists.

2.9 The PCM Downlink Gateway shall correlate a position within the PCM master frame with a measurement descriptor table entry.

2.10 The PCM Downlink Gateway shall stop processing measurement data, when an incorrect frame count or an unexpected format ID is recognized, in order to begin a search for sync and the beginning of the next valid frame of data.

2.11 The PCM Downlink Gateway shall not begin processing an area if sync has been lost until sync lock has been regained and the value of the frame count equals the reset value defined for that frame counter in the format list.

2.12 The PCM Downlink Gateway shall allow the frame reset value to be predefined for an area by the format list table.

2.13 The PCM Downlink Gateway shall not process an area that contains both a major frame count and subframe count until both frame counts are equal to their reset values.

2.14 The PCM Downlink Gateway shall discard voice portions of the downlink data stream.

2.15 The PCM Downlink Gateway shall issue a system message whenever the PCM Downlink Gateway's processing capacity is exceeded.

2.16 The PCM Downlink Gateway shall Block Log raw data when the PCM Downlink Gateway's processing capacity is exceeded.

2.17 The PCM Downlink Gateway shall issue a system message and update the Health and Status area when a format change has occurred without the appropriate format tables available in the PCM Downlink Gateway.

2.18 The PCM Downlink Gateway shall Block Log the frame containing a format change, and if it detects a format change has occurred without the appropriate format tables available in the PCM Downlink Gateway, a System Message shall be issued.

2.19 The PCM Downlink Gateway shall have the capability to detect a frame with invalid sync.

2.20 The PCM Downlink Gateway shall Block Log the first three consecutive frames with invalid sync and discard the fourth and following consecutive frames with invalid sync.

2.21 The PCM Downlink Gateway shall issue a system message and update the Health and Status area when it stops/resumes processing.

2.22 The PCM Downlink Gateway shall provide the capability to process up to eight distinct PCM areas.

2.23 The PCM Downlink Gateway shall be capable of tracking sync slippage in an embedded area within the PCM data stream.

2.24 The PCM Downlink Gateway shall lose no more than two major frames of PCM downlink data upon detection of a format change.

2.25 The PCM Downlink Gateway shall issue a system message and update the Health and Status area upon detection of a frame with invalid frame count.

2.26 The PCM Downlink Gateway shall Block Log only the first frame with invalid frame count and discard following consecutive frames with invalid frame count.

2.27 The PCM Downlink Gateway shall process requests to Activate/Inhibit Frame Logging (PCM Activate/Inhibit Frame Logging C-C) .

2.28 The PCM Downlink Gateway shall set the subsystem Terminal Error Indicator and send out a system message if the time between PCM HWCI interrupts exceed the Interrupt Timeout Value.

3 Operational Flight Instrumentation (OFI) Data Acquisition

3.1 The OFI PCM Downlink Gateway shall process OI, *PLD*, and GPC downlist data.

3.2 *The OFI PCM Downlink Gateway shall process requests to change the decom to area assignment for a given OI format.*

3.3 *The PCM Downlink Gateway shall reject requests to change the decom to area assignment if data acquisition is in progress.*

3.4 The OFI PCM Downlink Gateway shall be capable of processing one OI data area and up to three distinct GPC areas in a single Master Frame.

3.5 *The OFI PCM Downlink Gateway shall be capable of processing one OI data area and up to four distinct PLD areas in a single Master Frame.*

3.6 The OFI PCM Downlink Gateway shall be capable of handling format changes to any of the embedded areas of measurement data, each independent of the others.

3.7 The OFI PCM Downlink Gateway shall provide the capability to Block Log GPC Dump Data.

3.8 The OFI PCM Downlink Gateway shall write the maximum number of words to the GPC dump buffers if the word count is illegal.

3.9 The OFI PCM Downlink Gateway shall verify the checksum, when present, in a memory dump and issue a system message and update Health and Status if incorrect.

3.10 The OFI PCM Downlink Gateway shall have the capability to recover from loss of GPC sync lock at the next GPC reset frame count value.

3.11 The OFI PCM Downlink Gateway shall allow sync slippage of up to two embedded frames worth of fill data before determing it as an error condition.

3.12 The OFI PCM Downlink Gateway shall issue a system message when sync slippage of the *PLD* and/or GPC areas relative to the OI downlink exceeds the predefined allowable amount.

3.13 The OFI PCM Downlink Gateway shall issue a system message when sync recovery of the *PLD* and/or GPC areas is accomplished.

3.14 The OFI PCM Downlink Gateway shall continue its search for sync within an area until it is found.

3.15 The OFI PCM Downlink Gateway shall process GPC area frame count/format ID.

3.16 *The OFI PCM Downlink Gateway shall process payload area major and subframe count.*

3.17 The OFI PCM Downlink Gateway shall begin processing an area after processing a GPC data dump and recognizing the expected format ID in frame zero.

3.18 The OFI PCM Downlink Gateway shall set data invalid indicator for the Gateway in the Health and Status area after 3 consecutive sync errors.

3.19 The OFI PCM Downlink Gateway shall set data invalid indicator for the Gateway in the Health and Status area and discard remaining minor frames in an OI major frame if sync error occurs on minor frame zero.

3.20 The OFI PCM Downlink Gateway shall set data invalid indicators in the Health and Status area for the *PLD* and GPC areas and reset the expected frame count value in each area's Frame Count MDT to its default value on receipt of a sync or frame count error.

3.21 The OFI PCM Downlink Gateway shall not process data in frame with sync or frame count error.

4 Operational Flight Instrumentation (OFI) Format Switch

4.1 The OFI PCM Downlink Gateway shall verify that a new Format ID received in the telemetry stream is valid for the current TCID.

4.2 For OI Area format change, the OFI PCM Downlink Gateway shall resize the format list save areas based on the size information in the Area Telemetry Descriptor Table(ATDT).

4.3 For OI Area format change, the OFI PCM Downlink Gateway shall reinitialize the Decom Tables based on the bandwidth information in the ATDT.

4.4 For OI Area format change, the OFI PCM Downlink Gateway shall initialize the new GPC areas with the GPC formats used by the old OI format. If these GPC formats do not fit in the new areas, or if no old GPC format exists, use the Default GPC Format.

4.5 *For OI Area format change, the OFI PCM Downlink Gateway shall maintain in Health & Status the Decom Number for each logical payload area of the downlink.*

4.6 For OI Area format change, the OFI PCM Downlink Gateway shall maintain flags in Health & Status to indicate, for each area of the downlink, whether or not the Format ID is valid for the Gateway.

4.7 For any area format change, the OFI PCM Downlink Gateway shall issue a system message and update the Health and Status area if area 0 has not been successfully initialized.

4.8 For any area format change, the OFI PCM Downlink Gateway shall find the new format in the Format Information Table and validate that the format is compatible with the area. Issue a system message and update the Health and Status area if the format cannot be found, or if the format is incompatible with the area.

4.9 For any area format change, the OFI PCM Downlink Gateway shall setup the appropriate format lists and tables for the decom processing of the area.

4.10 For GPC and *PLD* area format change, the OFI PCM Downlink Gateway shall compute the length of the Data Cycle for this format.

4.11 For any area format change, the OFI PCM Downlink Gateway shall report successful or unsuccessful format switchs via a system message and update Health and Status.

5 Main Engine (ME) Data Acquisition

5.1 The ME PCM Downlink Gateway shall, during the "arm" step of a request from the active LDB Gateway, issue an Inhibit EIU Processing Command to the PCM Downlink Gateways configured to provide a PCM GPC (OFI) interface.

5.2 The ME PCM Downlink Gateway shall, in processing requests for SSME dump, report success or failure to "arm" to the active LDB Gateway.

5.3 The ME PCM Downlink Gateway shall, in processing requests for SSME Dump, provide the option to "disarm" a previously armed SSME Dump Command by issuing a Activate EIU Processing Command to the PCM Downlink Gateways configured to provide a PCM GPC (OFI) interface.

5.4 The ME PCM Downlink Gateway shall, in processing requests for SSME Dump, provide the capability to "disarm" it if a "go" step is not received within two seconds.

5.5 The ME PCM Downlink Gateway shall terminate an SSME Dump routing request after 50 frames of data without receiving a frame of dump data.

5.6 The ME PCM Downlink Gateway shall send SSME Dump data to the specified syscon.

5.7 The ME PCM Downlink Gateway shall issue an Activate EIU Processing Command to the OFI PCM Downlink Gateways after the dump frame has been received.

5.8 The ME PCM Downlink Gateway shall only Block Log the first dump frame for two or more consecutive readout requests to the same memory address.

5.9 The ME PCM Downlink Gateway shall provide the capability to monitor SSME data and determine SSME status.

5.10 *The ME PCM Downlink Gateway shall support SSME controller data stream memory dump from one of the SSME controllers.*

5.11 The ME PCM Downlink Gateway shall Block Log the 128-word ME controller memory dump.

5.12 The ME PCM Downlink Gateway shall monitor Vehicle Command Words (98 & 99) to determine if memory dump data is expected on the next valid frame.

5.13 The ME PCM Downlink Gateway shall, when processing Block II memory readouts, convert the start address from longword(15 bit) to conceptual (16 bit) before the data is logged or sent to a console.

5.14 The ME PCM Downlink Gateway shall have the capability to recognize and process an SSME Block II Hello Command.

5.15 The ME PCM Downlink Gateway shall have the capability to recognize a Block II Memory Readout Command (#FFF2 or #FFF1).

5.16 The ME PCM Downlink Gateway shall have the capability to recognize a Block II Failure Data Recorder(FDR) Cross Channel Readout Command (#F602 or #F601).

5.17 The ME PCM Downlink Gateway shall have the capability to recognize a Block II IE Low Readout Command(#F312 or #F311).

5.18 The ME PCM Downlink Gateway shall have the capability to recognize a Block II IE High Readout Command(#F322 or #F321).

5.19 The ME PCM Downlink Gateway shall have the capability to recognize a Block II IE I/O Readout Command(#F332 or #F331).

5.20 The ME PCM Downlink Gateway shall Block Log the first good frame of data following a frame with errors.

5.21 The ME PCM Downlink Gateway shall have the capability to detect a repeat frame flag in the BITE word and process the ME frame of data only if the previous frame was not processed.

5.22 The ME PCM Downlink Gateway shall perform the following validity checks on the ME data stream: sync pattern, column parity, EIU BITE status, repeat frame error check, word count, Controller ID words, and Controller Time Reference word.

5.23 The ME PCM Downlink Gateway shall be capable of utilizing an EIU Sync Pattern to ensure the validity of all frames from the controller.

5.24 The ME PCM Downlink Gateway shall utilize a column parity word which indicates odd parity for each bit position to ensure the validity of all frames from the controller.

5.25 The ME PCM Downlink Gateway shall provide the capability to enable and disable all validity checks except sync pattern check and column parity on ME PCM Downlink Gateway data.

5.26 The ME PCM Downlink Gateway shall determine that all enabled frame validity checks are successful before a frame is processed as valid.

5.27 The ME PCM Downlink Gateway shall maintain the status of the validity checks (enabled or disabled) in the Health and Status area.

5.28 The ME PCM Downlink Gateway shall maintain the total error count for each of the validity checks in the Health and Status area.

5.29 The ME PCM Downlink Gateway shall Block Log frame data that has failed validity checking.

5.30 The ME PCM Downlink Gateway shall clear the validity error counts in the Health and Status area on a switch in data sources.

5.31 The ME PCM Downlink Gateway shall identify each PCM/ME frame with an invalid word count as a word count error frame.

5.32 The ME PCM Downlink Gateway shall determine the Repeat Frame error check has failed if validity checks are enabled and the repeat frame indicator is on for more than three consecutive frames.

5.33 The ME PCM Downlink Gateway shall declare the link as invalid in the Health and Status area if validity checks are valid and the Repeat Frame Indicator is on for six or more consecutive frames.

5.34 *The ME PCM Downlink Gateway shall issue a system message and update Health and Status when an EIU sync error or column parity error is detected in a dump data frame.*

5.35 *The ME PCM Downlink Gateway shall not perform validity checks of controller ID words in repeat frames.*

5.36 The ME PCM Downlink Gateway shall check the BITE word to ensure the validity of all frames from the controller.

5.37 The ME PCM Downlink Gateway shall determine a frame invalid if controller ID words 2 and 3 are not 1's complements of each other when validity checks are enabled.

5.38 The ME PCM Downlink Gateway shall determine the link to be invalid when an individual validity check fails more than three consecutive times.

5.39 *The ME PCM Downlink Gateway shall determine the link to be invalid if there are ten consecutive validity check errors of any type.*

6 GMT Correlation

6.1 The OFI PCM Downlink Gateway shall process GMT Correlation requests.

6.2 The OFI PCM Downlink Gateway shall suspend telemetry stream processing of the OI area during a GMT Correlation request for no more than 1.3 seconds.

6.3 *The OFI PCM Downlink Gateway shall suspend telemetry stream processing of the GPC areas during a GMT Correlation request for no more than 3.3 seconds.*

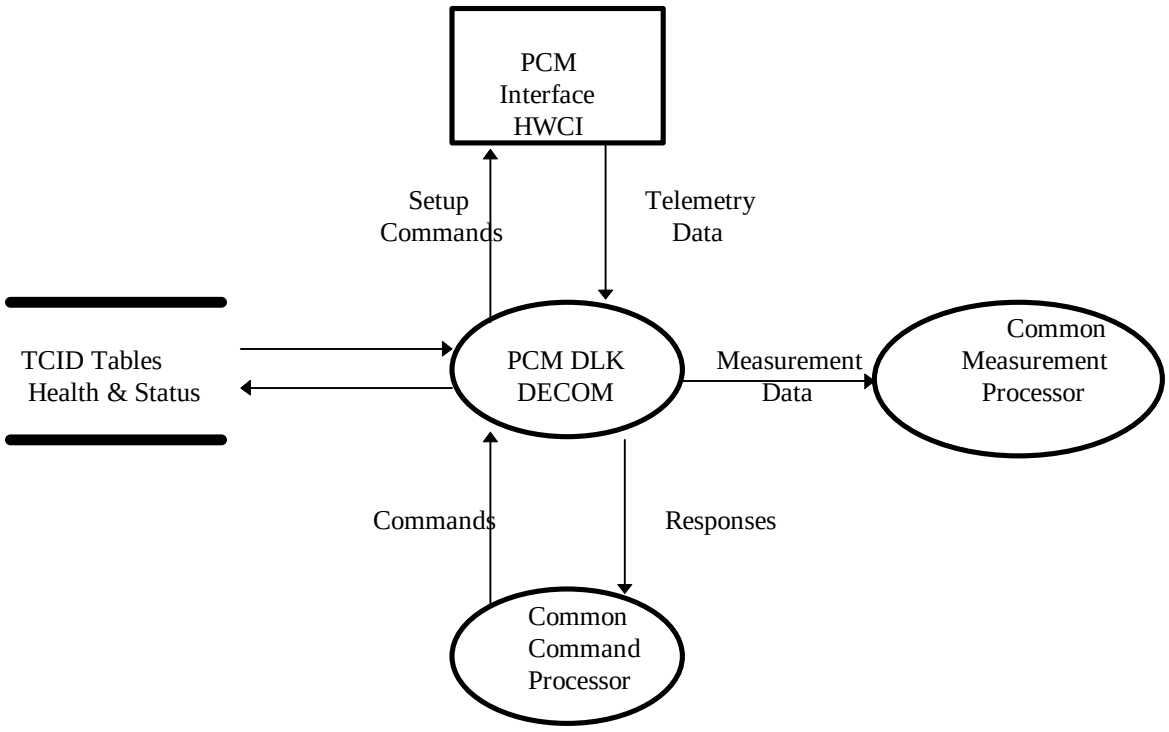
4.2.3 PCM DLK DECOMMUTATION CSC Performance Requirements

- The OFI PCM Downlink Gateway will be capable of processing 64, 96, 128, and 192 KBPS data rates.

- The OFI PCM Downlink Gateway will be capable of processing each OI minor frame before the next frame is received.

4.2.4 PCM DLK DECOMMUTATION CSC Interfaces Data Flow Diagrams

External Data Flow Diagram



The PCM DLK Decommutation CSC is responsible for all communications with the PCM Downlink HWCI. This CSC processes command requests from the Common Command Processor to setup processing and telemetry characteristics, as well as to start and stop data acquisition. When data acquisition is activated, this CSC uses information supplied with the Start request to access all the required tables in the TCID to initialize the PCM Downlink HWCI and to begin Decom Processing. These tables are loaded into memory by the PCM Table Load and Initialization CSC.

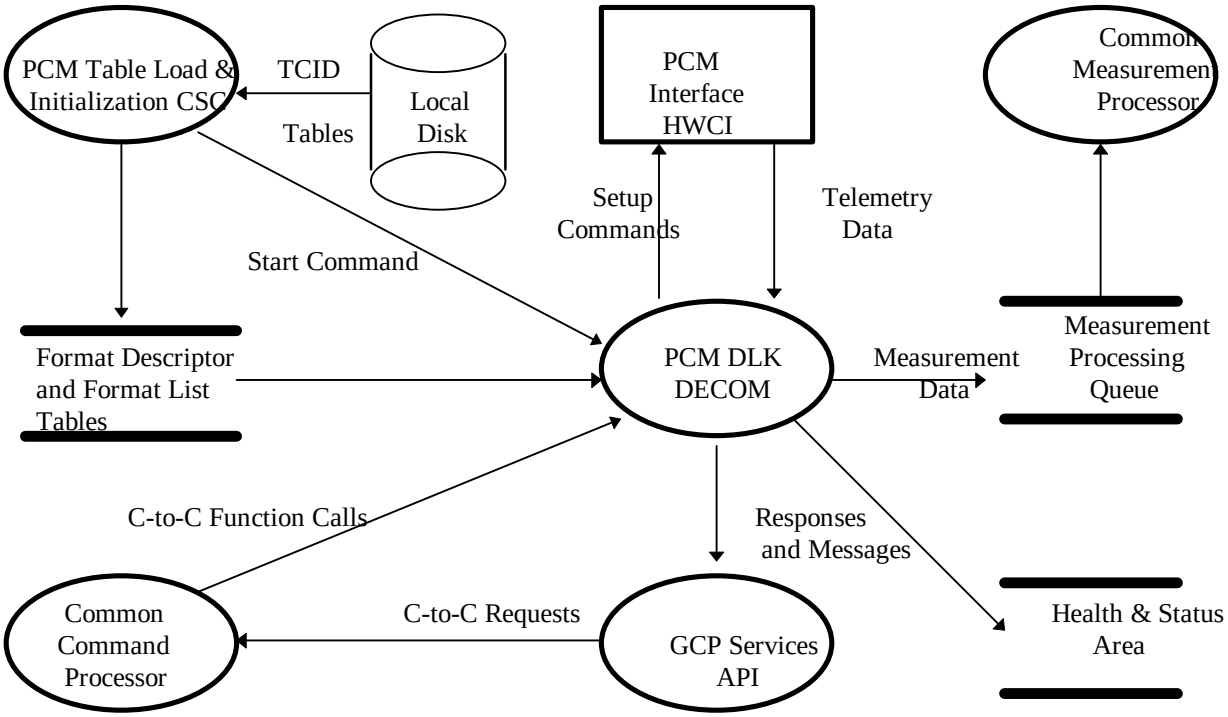
The PCM DLK Decommutation CSC tracks and processes the telemetry data as specified in the predefined Gateway TCID Tables. The Format List entries track the data words one for one and provides a pointer to an MDT which controls the processing characteristics of each measurement. This CSC extracts the value from the frame data and sends it and a pointer to the appropriate MDT to the Common Measurement Processor CSC to be processed.

4.3 PCM DLK DECOMMUTATION CSC Design Specification

The PCM DLK Decommutation CSC will perform three basic functions. The first function will be to initialize the PCM interface hardware. It's second function will be to extract measurement data from the input stream and pass it to the Common Measurement Processor. The third function will be to monitor the integrity of the input stream and the interface hardware. The Real Time Processing System will be notified of any errors detected by this monitoring process via System Messages.

4.3.1 PCM DLK DECOMMUTATION CSC Detailed Data Flow

Detailed Data Flow Diagram



The DLK Decom Task waits to be spawned by the PCM Initialization CSC. Once spawned, the CSC will perform all necessary functions required to bring the Task to a "Ready State". These functions are:

- Verify PCM interface hardware is present and capable of receiving commands.
- Verify that Gateway Tables are loaded.
- Initialize the Task's Health Count process.
- Notify the Real Time Processor System(RTPS) of the Task Status (successful/unsuccessful).

The Task is now ready to receive commands from the PCM Command Processor CSC.

When the Activate Data Acquisition Command is received, the Decom Task will check the command parameters to see if a Format Identification(FID) was specified. If no FID was specified then the Task will use a default FID

determined by the Gateway Identification. For OFI Gateway the default will be 129. It will then verify that an entry for this FID exists in the Area Telemetry Descriptor Table in the Gateway Tables built by the Table Load & Initialization CSC. If no entry exists, an appropriate Completion Code will be returned to notify RTPS that the command was unsuccessful.

If the specified FID has an entry in the Area Telemetry Descriptor Table, then the Decom CSC will retrieve the information necessary to initialize the hardware and to setup the telemetry area processing parameters. The CSC then locates the entry for this FID in the Format Information Table(FIT) to retrieve the remaining information needed to process the format.

One item of information contained in the FIT Entry, is a pointer to the Format List. This Format List is built by Table Load & Initialization CSC utilizing information provided in the TCID Tables. The Decom CSC will use the Format List to extract measurement data from the telemetry stream and put the data on a queue for the Measurement processing CSC to process.

The Decom CSC will process the following C-to-C requests:

Route Code	Request ID	Command	CSC Function
8	1	Activate data acquisition	pcm_activate_data_acquisition()
8	2	Inhibit data acquisition	pcm_inhibit_data_acquisition()
8	3	PCM Change SYNC Bits in Error	pcm_change_sync_bit_errors()
8	8	Activate Frame Logging	pcm_activate_frame_logging()
8	9	Inhibit Frame Logging	pcm_inhibit_frame_logging()
8	10	PCM Select	pcm_select()

These requests are passed to the Decom CSC from the Common Command Processor. Any response or System Message generated by the process of the request will be returned via the GCP Services API.

4.3.2 PCM DLK Decommutation CSC External Interfaces

4.3.2.1 PCM DLK Decommutation CSC Message Formats

4.3.2.1.1 PCM Interface Hardware Initialization Failure

Message Number =
Message Group = _____
Severity = Error

%s PCM Interface Hardware Initialization Failure

Insert#1 Text string Gateway ID

The Decom CSC software detected a hardware error while performing the CSC initialization function.

4.3.2.1.2 Tables Not Loaded

Message Number =
Message Group = _____
Severity = Error

%s Tables Not Loaded

Insert#1	Text string	Gateway ID

The Decom CSC software detected Decom Tables unavailable when performing the CSC initialization function.

4.3.2.1.3 Invalid Format ID Detected

Message Number =
Message Group = _____
Severity = Error

%s Invalid Format ID Detected Area %d Received = %d

Insert#1	Text string	Gateway ID
Insert#2	Integer	Area Number
Insert#3	Integer	Format ID Received

The Decom CSC software outputs this message for two conditions. One is the Format ID specified on the A DA Command is invalid. The other is that an invalid Format ID is detected while processing the input data.

4.3.2.1.4 Format Switch Successful

Message Number =
Message Group = _____
Severity = Informational

%s Format Switch To Format %d , Area %d Successful

Insert#1	Text string	Gateway ID
Insert#2	Integer	Format ID
Insert#3	Integer	Area Number

The Decom CSC software outputs this message after successfully initializing a format in an area.

4.3.2.1.5 Area 0 Not Initialized

Message Number =
Message Group = _____
Severity = Error

OFI Cannot Switch To Format %d , Area %d : Area 0 Not Initialized

Insert#1	Integer	Format ID
Insert#2	Integer	Area Number

The Decom CSC software can't process any other area until Area 0 has been initialized.

4.3.2.1.6 Unable to Initialize PCM Interface Hardware

Message Number =
Message Group = _____
Severity = Error

%s Unable To Initialize PCM Interface Hardware

Insert#1	Text string	Gateway ID

The Decom CSC software is unable to initialize the PCM Hardware when processing the A DA Command.

4.3.2.1.7 OFI Gateway OI Format ID/Frame Count Error

Message Number =
Message Group = _____
Severity = Error

OFI Gateway OI %s Error: Received = %d Expected = %d

Insert#1	Text string	Format ID or Frame Count
Insert#2	Integer	FID/FC Received
Insert#3	Integer	FID/FC Expected

The Decom CSC outputs this message when either a Format ID or Frame Count error is detected in the OI area of the input data.

4.3.2.1.8 OFI Gateway Area Format ID/Frame Count Error

Message Number =
Message Group = _____
Severity = Error

OFI Gateway Area %d %s Error: Received = %d Expected = %d

Insert#1	Integer	Area Number
Insert#2	Text string	Format ID or Frame Count
Insert#3	Integer	FID/FC Received
Insert#4	Integer	FID/FC Expected

The Decom CSC outputs this message when either a Format ID or Frame Count error is detected in a GPC or *Payload* area of the input data.

4.3.2.1.9 Consecutive Sync Errors Detected

Message Number =
Message Group = _____
Severity = Error

%s %d Consecutive Sync Errors Detected

Insert#1	Text string	Gateway ID
Insert#2	Text string	Number of Consecutive Sync Errors

The Decom CSC outputs this message when sync errors are detected in the input data.

4.3.2.1.10 Processing Has Resumed

Message Number =

Message Group = _____
Severity = Informational

%s Processing Has Resumed

Insert#1	Text string	Gateway ID

The Decom CSC outputs this message when processing resumes after being stopped due to sync errors.

4.3.2.1.11 Decom Process Reset When Max Errors Reached

Message Number =
Message Group = _____
Severity = Error

%s Decom Process Reset, %d Consecutive %s Errors Reached

Insert#1	Text string	Gateway ID
Insert#2	Integer	Number of Consecutive Errors
Insert#3	Text string	Format ID or Frame Count

The Decom CSC outputs this message when max allowed number of errors have been reached.

4.3.2.1.12 Area Lost Sync

Message Number =
Message Group = _____
Severity = Error

%s Area %d Lost Sync

Insert#1	Text string	Gateway ID
Insert#2	Integer	Area Number

The Decom CSC outputs this message when embedded sync errors are detected.

4.3.2.1.13 Area Regained Sync

Message Number =
Message Group = _____
Severity = Informational

%s Area %d Regained Sync

Insert#1	Text string	Gateway ID
Insert#2	Integer	Area Number

The Decom CSC outputs this message when sync is regained in an embedded area.

4.3.2.1.14 Area Good Format ID Or Frame Count Received

Message Number =
Message Group = _____
Severity = Informational

%s Area %d Good %s Received

Insert#1	Text string	Gateway ID
Insert#2	Integer	Area Number
Insert#3	Text string	Format ID or Frame Count

The Decom CSC outputs this message when a GPC or *Payload* Area has successfully locked up on data after a previous Format ID/Frame Count error.

4.3.2.1.15 GPC/Payload Frame Count MDT Reset Error

Message Number =
Message Group = _____
Severity = Error

%s Area = %d GPC/*Payload* Frame Count MDT Reset Error

Insert#1	Text string	Gateway ID
Insert#2	Integer	Area Number

The Decom CSC outputs this message when the GPC/*Payload* Frame Count MDT location in the format list
for the area does not match the location computed in the Format Switch Process.

4.3.2.1.16 Area Format List Load Error

Message Number =
Message Group = _____
Severity = Error

%s Cannot Load Format List For Format %d , Area %d

Insert#1	Text string	Gateway ID
Insert#2	Integer	Format ID
Insert#3	Integer	Area Number

The Decom CSC outputs this message when format detected does not fit the area.

4.3.2.1.17 Pending PCM Select Parameters Used

Message Number =
Message Group = _____
Severity = Error

%s %d Sync Errors Reached, Pending PCM Select Parameters Will Be Used

Insert#1	Text string	Gateway ID
Insert#2	Integer	Number of Consecutive Errors

The Decom CSC outputs this messages when max allowable sync errors are reached when a PCM Select Command is in Pend Mode.

4.3.2.1.18 OFI Invalid Checksum Detected

Message Number =
Message Group = _____
Severity = Error

OFI Invalid Checksum Detected In GPC/Spacelab Dump
Calc Checksum %d GPC Checksum %d Word Count %d
Start Address %d End Address %d Frame %d

Insert#1	Integer	Gateway Calculated Checksum
Insert#2	Integer	GPC Calculated Checksum
Insert#3	Integer	Number Of Words In Frame
Insert#4	Integer	Start Address of Memory in Frame
Insert#5	Integer	Stop Address of Memory in Frame
Insert#6	Integer	Frame Number

The Decom CSC outputs this message when its calculated checksum value for a GPC or Spacelab Memory Dump Frame does not match what the GPC calculated.

4.3.2.1.19 Gateway Processing Capacity Exceeded

Message Number =
Message Group = _____
Severity = Error

%s Processing Capacity Exceeded

Insert#1	Text string	Gateway ID

The Decom CSC outputs this messages when the queue used to pass measurement data to the Measurement
Processing CSC is full.

4.3.2.1.20 PCM Hardware Interface Timeout

Message Number =
Message Group = _____
Severity = Error

%s PCM Hardware Interface Timeout

Insert#1	Text string	Gateway ID

The Decom CSC outputs this messages when the Interface Hardware fails to generate an interrupt in a specified amount of time.

4.3.2.2 PCM DLK Decommutation CSC C-to-C Communications

4.3.2.2.1 PCM Activate Data Acquisition

Activate Data Acquisition for this Gateway with specified Format Identification.

PCM Activate Data Acquisition Command (Routing Code 8, Request ID 1)

Bytes	C-C TO DESTINATION(S)	Bytes	RESPONSE FROM DESTINATION
	Header		Header
1	Format Identification (optional)	2	Completion Code

Response Completion Codes:
- Successful
- Data Acquisition already active
- Unable to initialize PCM Interface Hardware

4.3.2.2.2 PCM Inhibit Data Acquisition

Inhibit Data Acquisition for this Gateway.

PCM Inhibit Data Acquisition Command (Routing Code 8, Request ID 2)

Bytes	C-C TO DESTINATION(S)	Bytes	RESPONSE FROM DESTINATION
	Header		Header
4	Gateway Identification	2	Completion Code

Response Completion Codes:
- Successful
- Data Acquisition already inhibited

4.3.2.2.3 PCM Change SYNC Bits in Error

Change SYNC Bits in Error changes the maximum allowable SYNC bit errors for this Gateway to the specified value.

PCM Change SYNC Bits in Error Command (Routing Code 8, Request ID 3)

Bytes	C-C TO DESTINATION(S)	Bytes	RESPONSE FROM DESTINATION
	Header		Header
4	Gateway Identification	2	Completion Code
2	Max allowable sync bit errors	2	Old Value
		2	New Value

Response Completion Codes:
- Successful

4.3.2.2.4 PCM Activate Frame Logging

Activate Frame Logging causes the Gateway to Block Log each input frame of data before processing it.

PCM Activate Frame Logging Command (Routing Code 8, Request ID 8)

Bytes	C-C TO DESTINATION(S)	Bytes	RESPONSE FROM DESTINATION
	Header		Header
4	Gateway Identification	2	CC

Response Completion Codes:
- Successful
- Frame Logging already Active

4.3.2.2.5 PCM Inhibit Frame Logging

Inhibit Frame Logging causes the Gateway to terminate Block Logging of each input frame of data before processing it.

PCM Inhibit Frame Logging Command (Routing Code 8, Request ID 9)

Bytes	C-C TO DESTINATION(S)	Bytes	RESPONSE FROM DESTINATION
	Header		Header
4	Gateway Identification	2	CC

Response Completion Codes:

- Successful
- Frame logging already inhibited

4.3.2.2.6 PCM Select

PCM Select provides the capability to change the parameters used to initialize the PCM hardware. The parameters are source, polarity, loop, voice, and rate. This command also provides the capability to apply these parameters immediately, set them up as pending, or cancel parameters that have previously been setup as pending.

PCM Select Command (Routing Code 8, Request ID 10)

Bytes	C-C TO DESTINATION(S)	Bytes	RESPONSE FROM DESTINATION
	Header		Header
2	PCM Parameters	2	CC
2	Execution Option		

Response Completion Codes:

- Successful

4.3.2.3 PCM DLK Decommutation CSC Recorded Data

The Decom CSC records two items. Both are through the Block Log function. The first item is a frame of raw data which has a “FT” identifier. These frame are logged if they contain a sync error, a frame count error, or a new format ID to process. If PCM Frame Logging is active, all input frames are logged with this identifier. Also if processing capacity has been exceeded, all input frames will be logged. The second item is a frame of GPC Dump Data which has a “FX” identifier. These frames are logged for Format 93.

Name of Recorded Data	Recording Type	SDC	Local
“FT” PCM Telemetry Data	PCM Raw Data	X	
“FX” GPC Dump Data	PCM Raw Data	X	

4.3.2.4 PCM DLK Decommutation CSC Interface Calls

4.3.2.4.1 Activate Data Acquisition

```
void pcm_activate_data_acquisition (    GCPS_COMMAND_INFO_TYPE *info,
                                        void *body);
```

Description:	Activates data acquisition in the Gateway	
Parameters:	info	Pointer to a GCPS_COMMAND_INFO_TYPE structure as defined by the GCP Common Services API.
	body	Pointer to the message body.
Returns:	None	

4.3.2.4.2 Inhibit HIM Data Acquisition

```
void pcm_inhibit_data_acquisition (    GCPS_COMMAND_INFO_TYPE *info,
                                       void *body);
```

Description:	Inhibits data acquisition in the Gateway	
Parameters:	info	Pointer to a GCPS_COMMAND_INFO_TYPE structure as defined by the GCP Common Services API.
	body	Pointer to the message body.
Returns:	None	

4.3.2.4.3 PCM Change SYNC Bits in Error

```
void pcm_change_sync_bit_errors (    GCPS_COMMAND_INFO_TYPE *info,
                                     void *body);
```

Description:	Activates data acquisition in the Gateway	
Parameters:	info	Pointer to a GCPS_COMMAND_INFO_TYPE structure as defined by the GCP Common Services API.
	body	Pointer to the message body.
Returns:	None	

4.3.2.4.4 Activate Frame Logging

```
void pcm_activate_frame_logging (   GCPS_COMMAND_INFO_TYPE *info,
                                    void *body);
```

Description:	Inhibits data acquisition in the Gateway	
Parameters:	info	Pointer to a GCPS_COMMAND_INFO_TYPE structure as defined by the GCP Common Services API.
	body	Pointer to the message body.
Returns:	None	

4.3.2.4.5 Inhibit Frame Logging

```
void pcm_inhibit_frame_logging ( GCPS_COMMAND_INFO_TYPE *info,
                                 void *body);
```

Description:	Activates data acquisition in the Gateway	
Parameters:	info	Pointer to a GCPS_COMMAND_INFO_TYPE structure as defined by the GCP Common Services API.
	body	Pointer to the message body.
Returns:	None	

4.3.2.4.6 PCM Select

```
void pcm_select (               GCPS_COMMAND_INFO_TYPE *info,
                                void *body);
```

Description:	Inhibits data acquisition in the Gateway	
Parameters:	info	Pointer to a GCPS_COMMAND_INFO_TYPE structure as defined by the GCP Common Services API.
	body	Pointer to the message body.
Returns:	None	

4.3.2.5 PCM DLK Decommutation CSC Table Formats

4.3.2.5.1 Area Telemetry Descriptor Table

This Table contains all the information needed by the Decom CSC to initialize the interface hardware for an area 0 format ID and define the areas to be processed by the format.

AREA TELEMETRY DESCRIPTOR TABLE

WORD(s)	DESCRIPTION

#0000	Format Identification Number
#0001	Area 0 Bandwidth (words)
#0002	Area 1 Bandwidth (words)
#0003	Area 2 Bandwidth (words)
#0004	Area 3 Bandwidth (words)
#0005	Area 4 Bandwidth (words)
#0006	Area 5 Bandwidth (words)
#0007	Area 6 Bandwidth (words)
#0008	Area 7 Bandwidth (words)
#0009	Decom 1 Area Number
#000A	Decom 2 Area Number
#000B	Decom 3 Area Number
#000C	Decom 4 Area Number
#000D	Sync Word 1
#000E	Sync Word 2
#000F	Sync Mask 1
#0010	Sync Mask 2
#0011	Frame Length
#0012	Word Length
#0013	Allowable Sync Bits in Error
#0014	PCM Telemetry Type
#0015	Loop
#0016	Source
#0017	Polarity
#0018	Data Rate
#0019-1A	Bit Rate

4.3.2.5.2 Format Information Table

This Table contains unique information needed by the Decom CSC to processed a format.

FORMAT INFORMATION TABLE

WORD(s)	DESCRIPTION
#0000	Format Flags/Format Identification Number
#0001	Subframe Start Value Format
#0002	Number of Subframes per Major Frame
#0003	Subframe Increment
#0004	Minor Frame Start Value
#0005	Number of Minor Frames per Subframe
#0006	Minor Frame Increment
#0007	Channel Start Value
#0008	Format Bit Rate
#0009-A	Major Frame Period (seconds)
#000B	Pointer to Format List
#000C	Number of Format List Entries

4.3.2.5.3 Format List Table

This Table contains information needed by the Decom CSC to extract the measurement data in a format from the input telemetry data.

FORMAT LIST TABLE

WORD(s)	DESCRIPTION
#0000	Subframe Count
#0001	Minor Frame Count
#0002	Channel Number
#0003	Start Bit
#0004	Length (words)
#0005	FDID Sample Rate
#0006	MDT Pointer
#0007	FD Identification (null = #FFFFFFFF)

4.3.3 PCM DLK Decommutation CSC Test Plan

4.3.3.1 Environment

A development OFI gateway will be connected to the PCM Simulator. TCID tables which support OI Format ID 129 and GPC Formats 44 and 20 will be present on the OFI gateway local hard drive. Each of the commands supported will be sent and the response verified. The action taken by the command will also be verified as part of the verification of the CSC to which the command belongs. Commands will be generated which demonstrate each of the response codes, when possible.

4.3.3.2 Test tools

The OFI gateway will be commanded using a CCP/DDP simulator test tool developed by the gateway group. This tool is capable of generating and displaying the responses of all PCM gateway commands.

PCM input telemetry stream will be provided by a PCM Simulator test tool developed by the gateway group.

4.3.3.3 Test Cases

Process A DA Command
Process I DA Command
Process Activate Frame Logging Command
Process Inhibit Frame Logging Command
Process Change Sync Bits in Error Command
Process PCM Select Command
Process OI Format ID 129
Process OI Format ID 129 and GPC Area Formats 44 and 20
Sync Errors
Frame Count Errors
Format ID Errors